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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/740,078	12/18/2003	Marc Boulle	33155.15	1359
32300	7590	02/02/2007	EXAMINER	
BRIGGS AND MORGAN P.A. 2200 IDS CENTER 80 SOUTH 8TH ST MINNEAPOLIS, MN 55402			DAYE, CHELCIE L	
			ART UNIT	PAPER NUMBER
			2161	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		02/02/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>
	10/740,078	BOULLE, MARC
	<b>Examiner</b>	<b>Art Unit</b>
	Chelcie Daye	2161

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 18 December 2006.  
 2a) This action is FINAL.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 29-40 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 29-40 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) Notice of References Cited (PTO-892)  
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)  
 3) Information Disclosure Statement(s) (PTO/SB/08)  
     Paper No(s)/Mail Date 12/18/06.
- 4) Interview Summary (PTO-413)  
     Paper No(s)/Mail Date. \_\_\_\_\_.  
 5) Notice of Informal Patent Application  
 6) Other: \_\_\_\_\_

**DETAILED ACTION**

1. This action is issued in response to applicant's amendment filed December 18, 2006.
2. Claims 29-40 are presented. Claims 29-40 added and claims 1-28 cancelled.
3. Claims 29-40 are pending.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.
5. Claims 29,30, and 40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 29 recites the limitation "the variation of the merge criterion" in limitation (d) of the claim. Examiner is unsure as to what "variation" applicant is referring to, since there is no prior mention of such a variation. Therefore, there is insufficient antecedent basis for this limitation in the claim.

Claim 30 recites the limitation "said valuation variable" in the fourth line of the claim. Examiner is unsure as to what "valuation variable" applicant is referring to, since there is no prior mention of such a variable. Therefore, there is insufficient antecedent basis for this limitation in the claim.

Claim 40 is rejected for improper dependency. The claim as stated is reliant upon previously cancelled claims. Examiner is unable to determine the scope for the

dependent claim; therefore Examiner is unable to determine the limitation of the claim.

As a result, the claim will not be addressed in the prior art rejections below.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. **Claims 29-32 and 35-36, are rejected under 35 U.S.C. 103(a) as being unpatentable over “ChiMerge: Discretization of Numeric Attributes”, by: Randy Kerber, published: 1992; referred to hereinafter as ‘Kerber’, in view of “Relative Unsupervised Discretization for Regression Problems”, by: Marcus Ludl, published: 2000; referred to hereinafter as ‘Ludl’, and further in view of “Chi2: Feature Selection and Discretization of Numeric Attributes”, by: Juan Liu, published: 1995; referred to hereinafter as ‘Liu’.**

Regarding Claim 29, Kerber discloses a method of discretization/grouping of a source attribute or a source attributes group of a database containing a population of individuals with the object in particular of predicting modalities of a given target attribute, said method comprising the following steps of:

- (a) partitioning of said modalities of said source attribute or said attributes group into elementary regions (pg.123, 2<sup>nd</sup> ¶ and pg.124, column 2, lines 1-7, Kerber),
- (b) evaluating of a merge criterion for each pair of elementary regions, the merge criterion taking into account the set of all elementary regions of the partitioning (pg.124, column 2, 1<sup>st</sup> full ¶, Kerber),
- (d) skipping directly to step (f) as long as a value representative of the variation of the merge criterion before and after merge, is not within a predetermined zone of atypical values (pg.125, 1<sup>st</sup> ¶, Kerber)<sup>1</sup>, and
- (f) otherwise merging and reiterating of steps b) to e) (pg.124, column 2, 2<sup>nd</sup> full ¶, Kerber).

However, Kerber is silent with respect to (c) searching, among the set of pairs of elementary regions that can be merged, for the pair of elementary regions for which the merge criterion would be optimized. On the other hand, Ludl discloses searching, among the set of pairs of elementary regions that can be merged, for the pair of elementary regions for which the merge criterion would be optimized (Fig.2; pgs.248-249, section 3.3 – entirety, Ludl). Kerber and Ludl are analogous art because they are from the same field of endeavor of discretization of attributes. It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate Ludl's teachings into the Kerber system. A skilled artisan would have been motivated to combine as suggested by

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<sup>1</sup> Examiner Notes: The predetermined zone of atypical values corresponds with the threshold values.

Ludl at pgs.246 and 247, last ¶, in order to present a context-sensitive discretization algorithm that can be used in both supervised and unsupervised settings; wherein the trees within the discretization strategy are significantly smaller, while only losing minimal accuracy. As a result, providing a considerable advantage for comprehensibility issues, which ultimately optimizes the system. However, Kerber in view of Ludl are silent with respect to (e) stopping the method if there are no elementary regions whose merge would have a consequence of improving said merge criterion. On the other hand, Liu discloses stopping the method if there are no elementary regions whose merge would have a consequence of improving said merge criterion (pg.389, column 1, lines 8-11, Liu). Kerber, Ludl, and Liu are analogous art because they are from the same field of endeavor of attribute discretization. It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate Liu's teachings into the Kerber in view of Ludl system. A skilled artisan would have been motivated to combine as suggested by Liu at pg. 391, in order to create a simple algorithm to determine the intervals of attributes and also select features according to characteristics of data. Therefore, the algorithm continues until an inconsistency is detected, forcing the system to stop.

Regarding Claim 30, the combination of Kerber in view of Ludl, and further in view of Liu, disclose a method of discretization/grouping of a source attribute or source attributes group, wherein said predetermined zone of atypical values is

such that for a target attribute independent of said source attribute or said source attributes group, the value of said valuation variable of the merge under consideration is not within said zone (pg.124, column 2, 1<sup>st</sup> full ¶, Kerber) with a predetermined probability p (pg.125, 1<sup>st</sup> ¶, Kerber).

Regarding Claims 31 and 35; the combination of Kerber in view of Ludl, and further in view of Liu, disclose a method of discretization of a source attribute of a database containing a population of individuals with the object in particular of predicting modalities of a given target attribute, said method comprising the following steps of:

- (a) partitioning of said modalities of the source attribute into adjacent two-by-two elementary intervals, all these intervals forming a set (pg.123, 2<sup>nd</sup> ¶ and pg.124, column 2, lines 1-7, Kerber),
- (b) evaluating for each pair of adjacent elementary intervals of said set, of the value of  $\chi^2$  of a contingency table after a possible merge of said pair (pg.124, column 2, 1<sup>st</sup> full ¶, Kerber),
- (c) searching, among the set of pairs of elementary intervals that can be merged, for the pair of elementary intervals whose merge would maximize the value of  $\chi^2$  (Fig.2; pgs.248-249, section 3.3 – entirety, Ludl),
- (d) skipping directly to step f) as long as the value  $\Delta\chi^2$  of the variation of the value of  $\chi^2$  before and after merge is, in absolute

value, less than a predetermined threshold value Max.DELTA..chi..sup.2

(pg.125, 1<sup>st</sup> ¶, Kerber),

(e) stopping of the method if there are no elementary intervals that make it possible to reduce a probability of independence (pg.389, column 1, lines 8-11, Liu), and

(f) otherwise merging and reiterating of steps (b) to (e) (pg.124, column 2, 2<sup>nd</sup> full ¶, Kerber).

Regarding Claims 32 and 36, the combination of Kerber in view of Ludl, and further in view of Liu, disclose a discretization method wherein said predetermined threshold value Max.DELTA..chi..sup.2 is such that for a target attribute independent of the source attribute the value .DELTA..chi..sup.2 of the variation of the value of .chi..sup.2 before and after merge is always less than said value Max.DELTA..chi..sup.2 (pg.124, column 2, 1<sup>st</sup> full ¶, Kerber) with a predetermined probability p (pg.125, 1<sup>st</sup> ¶, Kerber).

#### ***Allowable Subject Matter***

8. Claims 33 and 37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the predetermined threshold value Max.DELTA..chi..sup.2 is equal to the function of .chi..sup.2 of degree of freedom equal to the number J of modalities of the target attribute minus one for a second probability p to the power 1/N where N is the size of the sample of the part of the database to which said discretization method is applied: Max.DELTA..chi..sup.2=Inv.chi..sup.2.sub.J-1(p.sup.1/N), where Inv.chi..sup.2 is the function that gives the value of .chi..sup.2 as a function of a given probability p and establishing the predetermined threshold value Max.DELTA..chi..sup.2 consists in using a previously calculated table of values of mean and standard deviation as a function of the number of modalities of the source attribute and of the number of modalities of the target attributes to determine by linear interpolation from said table of values the mean and standard deviation of Max.DELTA..chi..sup.2 corresponding to the attributes to be grouped, and then to determine, by using the inverse normal law, the corresponding predetermined threshold value Max.DELTA..chi..sup.2 which will not be with the probability p.

As such, claims 34 and 38-39 are dependent upon currently objected claims and therefore appropriate the above stated claims are also objected to as being allowable.

***Other Prior Art Made of Record***

1. Evans et al. (US Patent No. 6,336,106) discloses a system and method for partitioning a real-value windowed attribute into ranges, wherein the values within each range generally correspond to a particular class of results associated with runs of a process.

***Response to Arguments***

*Applicant argues, Kerber discloses criterion that is local for two adjacent intervals and not global for all intervals of the partition as stated in the newly added characteristic in the limitation (b) of claim 29.*

Examiner respectfully disagrees. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., global criterion) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). As such, the claims can only be examined with limitations that are actually in the claim language.

*Applicant argues, Ludl discloses a method that does not use an optimized criterion.*

Examiner respectfully disagrees. As stated in the office action, Ludl discloses at page 248, section 3.3 in its entirety; wherein a RUDE algorithm is created and used in order to map sequences of values, thereby creating split points on positions where

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some significant distribution changes occur. Also, for pre-discretizing source attributes, using equal-width discretization provides for a most efficient method, with desirable statistical properties. As such, examiner interprets the significant distribution, the efficiency of the method and the desirable statistical properties to outline the strengths (i.e. optimizing) of the merge. For further clarification, Ludl discloses at "experimental results" on page 251, 3<sup>rd</sup> paragraph, wherein the best results are compared and an output is devised from the results. As a result, Ludl discloses the claim limitation as stated.

*Applicant argues, none of the references cited disclose "the variation of the merging criterion is taken into account to force the merging step as long as the second criterion is not fulfilled".*

Examiner respectfully disagrees. As stated in the office action, Kerber discloses at page 15, 1<sup>st</sup> paragraph; wherein the ChiMerge algorithm specifies a threshold value for selecting a desired significance level. Then using a table, obtaining the corresponding value in which to derive a probability score for the merging step. An alternative approach is also for the user to select minimum and maximum intervals, which specify upper and lower limits of intervals to create. This approach allows for the prevention of an excessive number of intervals from being created. A further clarification is found within the "Example" on page 125, wherein Figure 2 provides both an intermediate and a final discretization of attributes when the ChiMerge algorithm is applied. Examiner associated the intermediate discretization to represent before merge

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and the final discretization to represent the after merge. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Specifically, applicant argues, "forcing the merging step" and "a second criterion". However, the claim language does not support the merging step being forced by any criterion and the limitation of a "second criterion" is not to be found within the claim language. Examiner notes the use of a merge criterion, and for argument sake associates that particular criterion to correspond to a first criterion. However, there is no other mention of an alternate criterion being used throughout the claim language.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action.

Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

***Points of Contact***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chelcie Daye whose telephone number is 571-272-3891. The examiner can normally be reached on M-F, 7:00 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Apu Mofiz can be reached on 571-272-4080. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chelcie Daye  
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January 30, 2007

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